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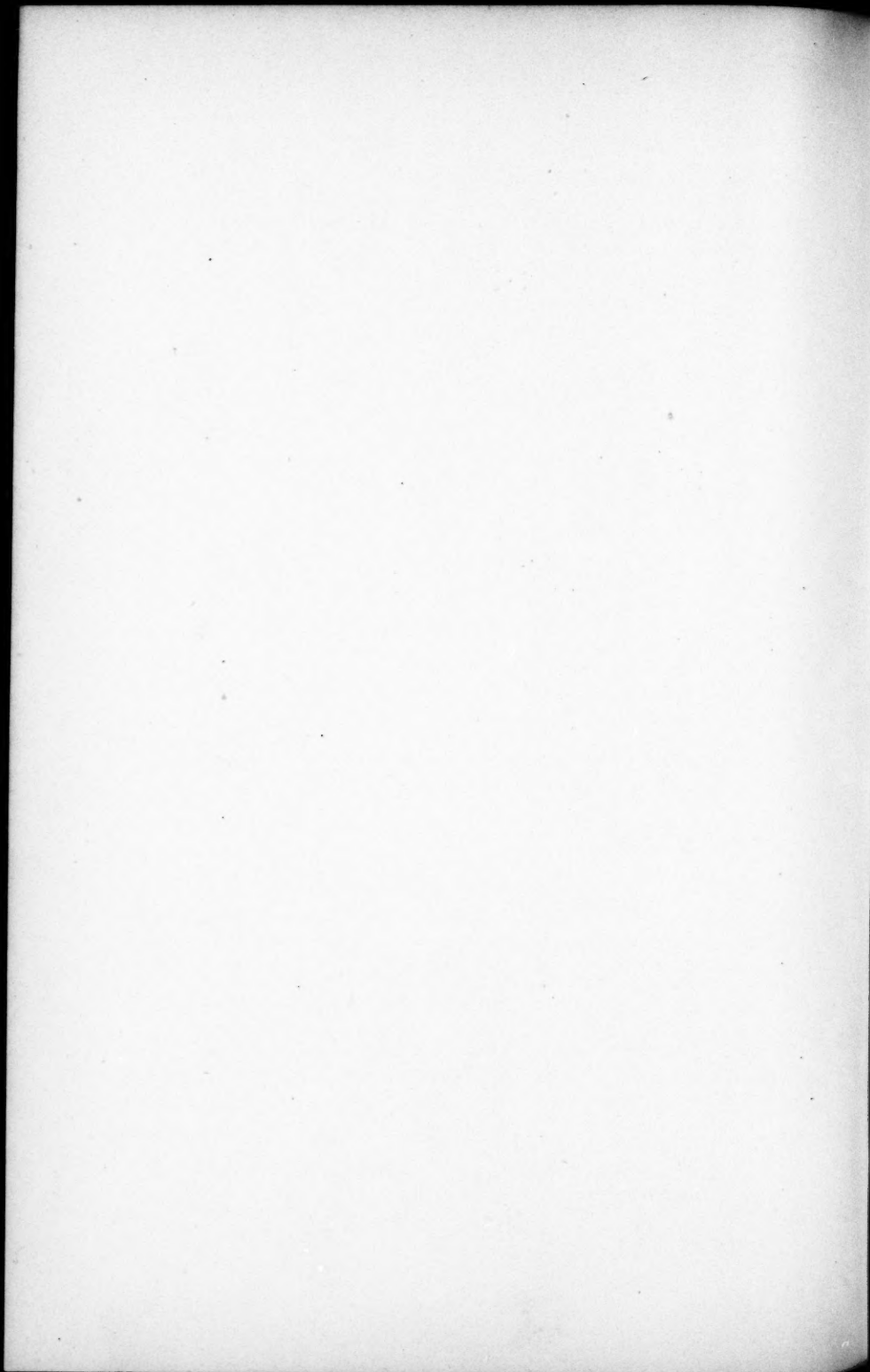
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OF THE MUSEUM OF COMPARATIVE ZOÖLOGY  
AT HARVARD COLLEGE. — No. 239.

*ON THE SIZE OF LITTERS AND THE NUMBER  
OF NIPPLES IN SWINE.*

BY G. H. PARKER AND C. BULLARD.



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La vache s'écarte, à cet égard, d'une manière bien remarquable des lois générales de la nature, qui a proportionné dans toutes les espèces le nombre des mamelles des mères à celui de leurs petits; elle a quatre mamelles, quoiqu' elle ne porte qu'un veau et bien rarement deux, parce que ces deux mamelles superflues étoient destinées à être les nourrices du genre humain. La truie, à la vérité, n'en a que douze, et elle nourrit jusqu'à quinze petits. Ici la proportion paroît défectueuse. Mais si la première a plus de mamelles qu'il n'en faut à sa famille, et si la seconde n'en a pas assez pour la sienne, c'est que l'une devoit donner à l'homme la surabondance de son lait, et l'autre celle de ses petits. Saint-Pierre. *Études de la Nature*, Paris, 1792, tome I, p. 412.

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INTRODUCTION.

As the accompanying quotation from the author of "Paul and Virginia" shows, naturalists have long been of opinion that an intimate relation exists between the size of the litter in any given species of mammal and the number of nipples possessed by its females. This relation has likewise come to the attention of anatomists; thus Gegenbaur (1898, p. 130) in his account of the mammary glands, declares that "die Zahl der Zitzen steht in inniger Beziehung zur Menge der Jungen." It is the chief object of this paper to discuss the relation of the size of litters to the numbers of nipples in the domesticated swine, *Sus scrofa* Linn.

The data for this investigation were collected from litters of unborn but nearly mature pigs that were available at one of the large slaughtering establishments in Cambridge, Massachusetts. The sows from which these litters were obtained, came chiefly from the corn-belt of the Mississippi Valley and were in general about two years old. They were of various breeds. Each set of records was taken from the contents of a single uterus. On opening the uterus, the number of pigs and their relative position in each horn was recorded, as well as the sex of each pig and the number and arrangement of its nipples. In all 1000 litters were examined, the records of which are given in an appendix at the end of this paper. We are under obligations to Mr. H. D. Fish for assistance in calculating and checking the results.

In dealing with the relation of the size of the litter to the number of nipples, we shall take up, first, the composition of the litters, then the number and arrangement of the nipples, and, finally, a comparison of the numbers of young in the litters with the numbers of nipples in the females.

#### COMPOSITION OF THE LITTERS.

*Numbers of pigs in a litter.* As already stated, the total number of litters that we examined was 1000, and the number of pigs in a litter varied from 1 to 15. The maximum number of 20 in a litter, as assumed by Aristotle (1883, p. 164), or any excess of that number, as noted by Gilbert White (1870, p. 222), was not met with by us. The frequency with which litters of different numbers occurred is given in Table 1.

TABLE 1.

A THOUSAND LITTERS CLASSIFIED ACCORDING TO THE NUMBER OF PIGS IN EACH.

Number of pigs in a litter	1	2	3	4	5	6	7	8
Number of litters	15	50	74	134	137	189	164	116
Number of pigs in a litter	9	10	11	12	13	14	15	Total
Number of litters	61	32	15	6	3	3	1	1000

Since the thousand litters contained in all 5970 pigs, the mean number of pigs per litter is 5.97 which is very close to the mode, 6, as shown in Table 1. These numbers are smaller than those given by Surface (1909), who found litters of Poland China pigs to vary from



1 to 15, with a mean of 7.435 and a mode of 7, and litters of Duroc Jersey pigs to vary from 1 to 19, with a mean of 9.337 and a mode of 9, differences that may have been due to the fact that in many instances the litters in our records were the first litters produced by unselected females and may therefore have been smaller than those of females taken for breeding purposes.

*Sexes.* Of the 5970 pigs, 2946, or 49+ percent, were females and 3024, or 51— percent, were males; that is, for every 100 females there were 102.6+ males. This proportion agrees closely with that observed by Wentworth (1912, p. 548) according to whom the males exceed the females by about 2.02 percent. It is somewhat less than the number given by Darwin (1895, p. 247), who stated, on the authority of Mr. Wier, that there are about 7 males to 6 females, that is, the males exceed the females by about 16.7 percent.

The distribution of the sexes in the litters of different sizes is given in Table 2.

TABLE 2.  
NUMBERS AND PROPORTIONS OF MALE AND FEMALE PIGS IN 1000 LITTERS OF DIFFERENT SIZES.

Numbers of pigs in litter	1	2	3	4	5	6	7	8
Total numbers of females	6	46	112	264	354	556	538	449
Total numbers of males	9	54	110	272	331	578	610	479
Percentage frequency of males	60	54	50—	51—	48+	51—	54—	51+
Numbers of pigs in litter	9	10	11	12	13	14	15	Totals
Total numbers of females	280	172	87	41	15	19	7	2946
Total numbers of males	269	148	78	31	24	23	8	3024
Percentage frequency of males	49—	46+	47+	43+	62—	55—	54—	51—

An inspection of Table 2 will show that in no class does the percentage of males rise above 62 nor fall below 43, but it is close to the general average, 51— percent, in all the classes of litters except the extremely small one (1) and the large ones (10 to 15). In the former it is somewhat above the general average; in the latter it is below in litters of 10 to 12 pigs and above in litters of 13 to 15. These relations, however,

even in the extreme cases, are so nearly uniform that we may conclude with reasonable assurance that there is no intimate relation between sex and the size of the litter.

The thousand litters that we worked upon, then, were composed of from 1 to 15 pigs each, most frequently of 6, and the sexes were distributed almost indiscriminately among them in the ratio of about 1026 males to 1000 females.

#### THE NUMBER AND ARRANGEMENT OF THE NIPPLES.

*Introductory.* The nipples on pigs form two series situated on either side of the ventral median line and extending from the pectoral to the inguinal regions. In some pigs the nipples in these two series are so exactly paired, right and left, as to give the appearance of extreme segmental regularity. In others they are grouped on the two sides with so much diversity in number and arrangement as to seem to be quite irregular. These relations have been discussed by Bateson (1894, p. 190) and especially by Wentworth (1913), who has developed a somewhat extended classification to include the chief variations. This aspect of the subject is not essential to our problem and we have, therefore, not attempted to deal with it. In collecting our data, we have incidentally recorded the arrangement of the nipples as either regular or irregular. By a regular arrangement we mean one in which the nipples are grouped in pairs right and left and we have used this term to include cases where certain members of assumed pairs were absent. By an irregular arrangement we mean one in which the members of the right and left series are so disposed as to show no obvious pairing. Most examples fall naturally under one or other of these heads, but the process of classifying is at times somewhat artificial. These two classes do not agree with the two chief classes established by Wentworth (1913) on the basis of what he calls the symmetrical and the asymmetrical patterns. These patterns have not been clearly defined, but apparently they refer to the even or odd numbers of nipples possessed by the animal in the sense that when one side exhibits the same number of nipples as the other, the arrangement is called symmetrical; when otherwise, it is designated asymmetrical. The asymmetrical pattern may be due to a "suppressed nipple" or to the presence of a "triangular pattern" and the latter may exhibit several subordinate variations. Although some such classification as that proposed by Wentworth is necessary for a treatment of the subject from the standpoint of inheritance, our own observations have

shown us that the variations in the arrangements of the nipples are so irregular that any classification of them must be more or less artificial. Even in what we have called the regular plan, we are not disposed to admit of so close a comparison of organs as to favor the institution of a system of homologies for nipples such as Wentworth has suggested, but we are more inclined to the opinion advanced by Bateson (1894, p. 192) that the milk series as a whole is variously divided in different individuals or on the two sides of the same individual, and thus we have attempted to avoid that unreality to which extreme forms of morphological comparison lead. In discussing the arrangement of the nipples in swine, we shall, therefore, not lay much stress on close comparisons, but content ourselves with the division of the material into the two chief classes already designated as regular and irregular. In a few of the pigs that came under our observation nipples were found so near the median line as to appear to be median in position. Such nipples, however, can usually be shown to be really lateral in position, and, as a matter of fact, all have been classed as belonging to either the right side or the left.

TABLE 3.

THE PIGS OF 1000 LITTERS, IN ALL 5970, CLASSIFIED ACCORDING TO THE NUMBER OF NIPPLES IN EACH.

Numbers of nipples	8	9	10	11	12	13
Numbers of cases	1	7	697	1134	2094	962
Frequency per mill	1—	1+	117—	190—	351—	161+
Numbers of nipples	14	15	16	17	18	Total
Numbers of cases	738	208	111	14	4	5970
Frequency per mill	124—	35—	19—	2+	1—	1002

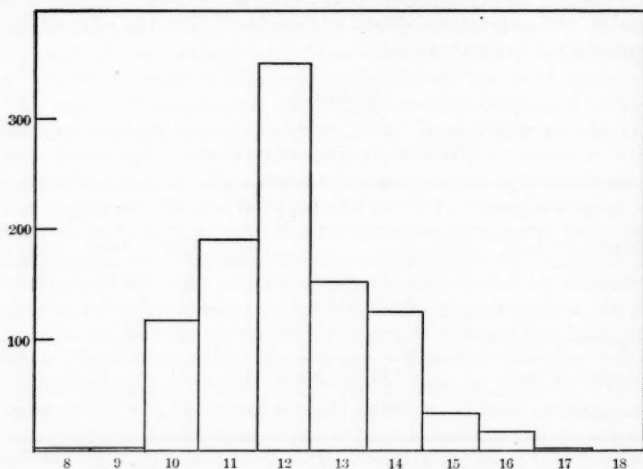
*Numbers of nipples in pigs.* Gegenbaur (1898, p. 129) makes the statement that swine possess from 8 to 10 nipples. Bateson (1894, p. 190) records for young pigs 12 to 16, and Wentworth (1913, p. 268) gives 8 to 16. In the thousand litters that we examined, as shown in Table 3, the smallest number of nipples present was 8, and the largest 18. The mode was 12, which was very near the mean number for the whole population, 12.2—.

In the pigs studied by Wentworth (1913, p. 269) the mode, which is even more marked than in our series, fell upon 10, instead of 12, a difference probably due to a difference in breeds.

Plotting the records contained in Table 3 in the form of a frequency polygon, Table 4, it is clear that the groups representing even numbers of nipples stand relatively high as compared with those representing odd numbers, a condition which indicates that the arrangement of nipples tends to be in pairs. This is also evident from the table given for Duroc Jersey swine by Wentworth (1913, p. 269), who has shown that the nipples are more probably inherited in pairs than laterally.

TABLE 4.

FREQUENCY POLYGON SHOWING THE DISTRIBUTION OF 5970 PIGS (1000 LITTERS) ACCORDING TO THE NUMBER OF NIPPLES ON EACH PIG. THE NUMBERS OF NIPPLES ARE PLOTTED AS ABSCISSAE AND THE NUMBER OF VARIATES AS ORDINATES (TABLE 3).



*Numbers of nipples in male and female pigs.* The numerical distribution of the nipples in male and in female pigs is given in Table 5.

In the 3024 male pigs the nipples ranged from 9 to 18, with a mean number of 12.4+ and a mode of 12, the standard deviation was  $0.6906 \pm .0060$ . In the 2946 female pigs the nipples ranged from 8 to 18 with a mean of 11.9+ and a mode of 12. The standard deviation was

0.7905  $\pm$  .0069. Thus the females are over 14 percent more variable than the males.

The similarity in the numbers of nipples in the males and in the females, as exhibited in Table 5, is noteworthy. When it is considered that the mammary glands, so far as is known, are only normally functional in the females and probably never have been functional in the males, even in the most primitive mammals, it is remarkable that the two sexes in pigs should at the outset of life show such considerable

TABLE 5.

PIGS FROM 1000 LITTERS, 3024 MALES and 2946 FEMALES, CLASSIFIED ACCORDING TO THE NUMBER OF NIPPLES ON EACH PIG.

Number of nipples	Males		Females	
	Observed numbers	Numbers per mill	Numbers per mill	Observed numbers
8	0	0.0	0.3	1
9	2	0.7	1.7	5
10	274	90.6	143.2	423
11	492	162.7	217.9	642
12	1004	332.0	370.3	1090
13	507	167.7	154.4	455
14	494	163.4	82.8	244
15	149	49.3	20.0	59
16	90	29.8	7.1	21
17	9	3.0	1.7	5
18	3	1.0	0.3	1
Totals	3024	1000.2	999.7	2946

similarity. The presence of embryonic nipples and the other rudiments of the mammary apparatus in male mammals must be dependent upon a continual process of inheritance from the female side, a process which is apparently the outcome of high female specialization, whereby traits which have arisen in that sex are, so to speak, forced upon the other. The result is that an organ functionless both in the past history and the present state of a sex is nevertheless continuously exhibited by that sex.

*Numbers of nipples on right and left sides.* The numbers of nipples on the right and on the left sides of pigs are recorded in Table 6.

The nipples on the left side range from 4 to 9 with a mean number of 6.1— and a mode of 6, and on the right side from 4 to 10 with a mean of 6.1+ and a mode of 6. This striking similarity is also shown in the percent of individuals in which the two sides agree in numbers, or

TABLE 6.

NUMBERS OF PIGS FROM 1000 LITTERS CLASSIFIED ACCORDING TO THE NUMBERS OF NIPPLES ON THE RIGHT AND LEFT SIDES.

Numbers of nipples	Left Side		Right Side	
	Observed numbers	Numbers per mill	Numbers per mill	Observed numbers
4	5	0.8	0.8	5
5	1461	244.7	198.1	1182
6	2938	492.1	529.6	3162
7	1324	221.8	228.9	1367
8	233	39.0	39.7	237
9	9	1.5	2.7	16
10	0	0.0	0.2	1
Totals	5970	999.9	1000.0	5970

differ by one, two, or three nipples. No cases were found where the two sides differed by as much as four nipples. This form of comparison for the whole population as well as for the separate sexes is given in Table 7.

TABLE 7.

PERCENTAGES OF PIGS IN 1000 LITTERS IN WHICH THE NIPPLES OF THE RIGHT AND LEFT SIDES AGREE IN NUMBER, OR DIFFER BY ONE, TWO, OR THREE. THE PERCENTAGES ARE GIVEN FOR THE WHOLE POPULATION (5970 INDIVIDUALS), THE MALES (3024 INDIVIDUALS), AND THE FEMALES (2946 INDIVIDUALS).

	Whole population	Males	Females
Agreement	58.6—	59.1—	58.1—
Difference of 1	38.9+	38.3—	39.6—
Difference of 2	2.5—	2.6—	2.4—
Difference of 3	0.03+	0.07—	0.0

The correlation of the nipples of the two sides of the pigs is given in Table 8.

The coefficient of correlation of the right and left sets of nipples is  $0.6063 \pm .0055$ , a somewhat lower degree of correlation than was found by Davenport and Bullard (1896, pp. 96) for the Müllerian glands on the fore legs of swine.

The correlation of the nipples of the two sides as exhibited by the two sexes is shown in Table 9 for the males and in Table 10 for the females.

TABLE 8.

CORRELATION BETWEEN THE NIPPLES OF THE RIGHT AND LEFT SIDES OF 1000 LITTER OF PIGS, 5970 INDIVIDUALS.

		Nipples of Right Side						
		4	5	6	7	8	9	10
Nipples of Left Side	4	1	4	0	0	0	0	0
	5	3	696	696	64	2	0	0
	6	1	438	1986	500	13	0	0
	7	0	44	460	705	112	3	0
	8	0	0	20	96	106	10	1
	9	0	0	0	2	4	3	0
	10	0	0	0	0	0	0	0

In the male pigs, as shown in Table 9, the nipples of the right side range from 4 to 10 with a mean of 6.2+ and a mode at 6; those of the left side range from 4 to 9 with a mean at 6.2— and a mode at 6. The coefficient of correlation in the males is  $0.6359 \pm .0073$ .

TABLE 9.

CORRELATION BETWEEN THE NIPPLES OF THE RIGHT AND LEFT SIDES OF THE MALE PIGS IN 1000 LITTERS, 3024 INDIVIDUALS.

		Nipples on Right Side						
		4	5	6	7	8	9	10
Nipples of Left Side	4	0	1	0	0	0	0	0
	5	1	274	307	26	2	0	0
	6	0	185	957	271	11	0	0
	7	0	21	234	467	77	1	0
	8	0	0	16	72	87	8	1
	9	0	0	0	2	1	2	0
	10	0	0	0	0	0	0	0

In the female pigs, as shown in Table 10, the nipples of the right side range from 4 to 9 with a mean of 6.0 — and a mode at 6; those of the left side also range from 4 to 9 with a mean of 5.9+ and a mode at 6. The coefficient of correlation in the females is  $0.5465 \pm .0087$ . Thus the females show slightly less correlation in respect to their two series of nipples than the males, a condition somewhat different from that found by Davenport and Bullard (1896, p. 96) for the Müllerian glands, which were about equally correlated in the two sexes.



TABLE 10.

CORRELATION BETWEEN THE NIPPLES OF THE RIGHT AND LEFT SIDES OF THE FEMALE PIGS IN 1000 LITTERS, 2946 INDIVIDUALS.

		Nipples of Right Side						
		4	5	6	7	8	9	10
Nipples of Left Side	4	1	3	0	0	0	0	0
	5	2	422	389	38	0	0	0
	6	1	253	1029	229	2	0	0
	7	0	23	226	238	35	2	0
	8	0	0	4	24	19	2	0
	9	0	0	0	0	3	1	0
	10	0	0	0	0	0	0	0

*Regular and irregular plans.* The proportions of pigs in which the nipples are arranged on the regular and the irregular plans (see p. 402) as seen in the whole population and in the sexes separately are given in Table 11.

TABLE 11.

PROPORTIONS IN 1000 LITTERS OF THE WHOLE POPULATION, OF MALES, AND OF FEMALES, THAT EXHIBITED THE REGULAR AND THE IRREGULAR ARRANGEMENT OF THE NIPPLES.

	Whole population		Males		Females	
	Number	Percent	Number	Percent	Number	Percent
Regular	3559	59.6+	1848	61.1+	1711	58.1-
Irregular	2411	40.4-	1176	38.9-	1235	41.9+

From Table 11 it is clear that in the population as a whole the regular arrangement occurs more frequently than the irregular one in the ratio of about 6 to 4. The proportion of instances of the regular arrangement is very slightly greater in the males than in the females.

The details of the various combinations of nipples under the two general plans, regular and irregular, are given for the population as a whole and for the sexes separately in Table 12.

What we have called the regular plan in the arrangement of the nipples has led to the assumption on the part of some investigators that the mammary glands are segmentally arranged, an opinion especially advocated by Williams (1891). But the conditions presented by many of the lower mammals do not seem to us to favor this



interpretation and we are inclined to regard the signs of segmentation as of quite secondary origin, perhaps the result of the segmental tendencies of the trunk exerting themselves on what would have been otherwise an irregular series. From this point of view we regard the irregular arrangement as the more primitive and the regular one as of later origin. Physiologically the best arrangement for the nipples would probably be one of alternation in the two rows such as is partially met with in what Wentworth has called the triangular pattern, for this would admit of the greatest freedom of access to the nipples for the young pigs as the sow lies on her side. Such an arrangement of the whole series of nipples is extremely rare, however, though what we have called the irregular plan approaches this more nearly than the regular one.

#### RELATION OF THE SIZE OF THE LITTERS TO THE NUMBER OF NIPPLES IN INDIVIDUAL PIGS.

We have now gathered the necessary data for a comparison of the size of the litter with the number of nipples in individual pigs. These relations are shown in Table 13 in which the sizes of the litters are plotted against the numbers of nipples in the females.

The number of pigs in a litter studied by us ranged from 1 to 15 with 6 as the mode. The number of nipples in female pigs ranged from 8 to 18 with a mode of 12. These figures show at once that no simple and close correlation is to be expected between the two series of records and this opinion is confirmed by the coefficient of correlation calculated from Table 13, namely  $0.0035 \pm .0124$ . This lack of correlation is also represented in the last column in Table 13, in which is given the mean number of nipples for litters of different sizes. An inspection of this column shows at once that there is no obvious tendency for the number of nipples to vary with the size of the litters; in other words, in swine, as in sheep (Bell, 1904, p. 768), the number of nipples is not obviously related to fecundity.

The relation of the size of the litters to the number of nipples can also be shown in superimposed frequency polygons, Table 14. Although there may be as few nipples as 8 and as many pigs in a litter as 15, it is quite evident from the nature of the overlapping of the polygons that disadvantageous combinations in which the number of young pigs outrun the provision for milk, cannot be of frequent occurrence and that in general, as indicated by the mode of 6 for the litters and 12 for the nipples, there are about twice as many nipples as young.

TABLE 12.

FREQUENCY AND MODE OF REPRESENTATION OF THE REGULAR AND IRREGULAR ARRANGEMENT OF NIPPLES IN 5970 PIGS (1000 LITTERS) DISTRIBUTED FOR THE SEXES SEPARATELY AND FOR THE POPULATION AS A WHOLE.

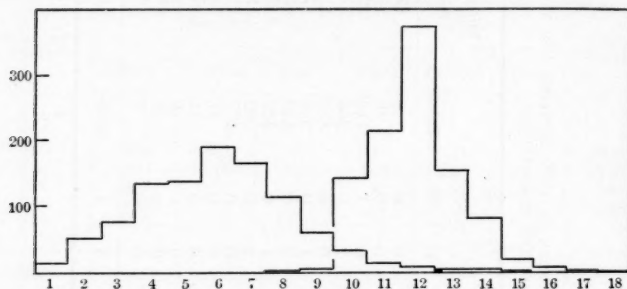
Numbers of nipples	Regular			Irregular			Grand Totals
	Male	Female	Total	Male	Female	Total	
Equal							
4-4	0	1	1	0	0	0	1
5-5	256	391	647	18	31	49	696
6-6	824	819	1643	133	210	343	1986
7-7	386	191	577	81	47	128	705
8-8	66	13	79	21	6	27	106
9-9	0	0	0	2	1	3	3
Differ by one							
4-5	0	0	0	1	3	4	4
5-4	0	0	0	1	2	3	3
5-6	75	93	168	232	296	528	696
6-5	64	81	145	121	172	293	438
6-7	52	36	88	219	193	412	500
7-6	72	60	132	162	166	328	460
7-8	13	5	18	64	30	94	112
8-7	17	8	25	55	16	71	96
8-9	3	2	5	5	0	5	10
9-8	1	1	2	0	2	2	4
Differ by two							
4-6	0	0	0	0	0	0	0
6-4	0	0	0	0	1	1	1
5-7	4	3	7	22	35	57	64
7-5	9	4	13	12	19	31	44
6-8	2	0	2	9	2	11	13
8-6	3	2	5	13	2	15	20
7-9	1	1	2	0	1	1	3
9-7	0	0	0	2	0	2	2
8-10	0	0	0	1	0	1	1
10-8	0	0	0	0	0	0	0
Differ by three							
5-8	0	0	0	2	0	2	2
8-5	0	0	0	0	0	0	0
Totals	1848	1711	3559	1176	1235	2411	5970

TABLE 13.  
CORRELATION BETWEEN THE SIZE OF LITTERS OF PIGS, AS SEEN IN 1000 LITTERS, AND THE  
NUMBERS OF NIPPLES IN FEMALES, AS SEEN IN 2946 INDIVIDUALS.

Numbers in Litters	Numbers of Nipples in Females											Mean Number of Nipples per Litter	
	8	9	10	11	12	13	14	15	16	17	18		Totals
1	0	0	0	1	3	2	0	0	0	0	0	6	12.17—
2	0	0	6	14	19	4	3	0	0	0	0	46	11.65+
3	0	0	12	26	36	24	10	3	0	0	0	112	12.08+
4	0	0	48	59	91	41	20	2	1	2	0	264	11.80—
5	0	0	53	84	138	49	25	4	1	0	0	354	11.79—
6	0	2	75	115	219	84	49	9	2	1	0	556	11.91+
7	0	1	73	118	200	78	47	15	4	0	0	538	11.94+
8	0	1	57	93	169	72	41	10	5	1	0	449	12.00—
9	1	0	46	65	101	37	16	9	4	1	0	280	11.84+
10	0	0	26	34	63	30	13	4	2	0	0	172	11.94+
11	0	0	20	13	31	14	7	2	0	0	0	87	11.78+
12	0	0	6	10	8	10	4	1	2	0	0	41	12.17+
13	0	0	0	4	7	4	0	0	0	0	0	15	12.00—
14	0	1	1	6	5	3	3	0	0	0	0	19	11.90—
15	0	0	0	0	0	3	4	0	0	0	0	7	13.57+
Totals	1	5	423	642	1090	455	244	59	21	5	1	2946	11.91—

TABLE 14.

SUPERIMPOSED FREQUENCY POLYGONS ILLUSTRATING THE DISTRIBUTION OF THE NUMBERS OF PIGS IN LITTERS (LEFT) AND THE NUMBERS OF NIPPLES ON THE FEMALES (RIGHT). THE NUMBERS OF PIGS AND OF NIPPLES ARE PLOTTED AS ABSISSAE AND THE NUMBERS OF VARIATES AS ORDINATES.



## SUMMARY.

1. 1000 litters of unborn pigs contained 5790 individuals; the mean number of pigs per litter was 5.97, the mode 6.
2. Of the 5790 pigs, 3024 were males and 2946 were females; there were 102.6+ males for every 100 females.
3. In the whole population the nipples ranged from 8 to 18 with a mean of 12.2+ and a mode of 12.
4. In the male pigs the nipples ranged from 9 to 18 with a mean of 12.4+ and a mode of 12, and a standard deviation of  $0.6906 \pm .0060$ ; in the females the range was from 8 to 18 with a mean of 11.9+, a mode of 12, and a standard deviation of  $0.7905 \pm .0069$ .
5. On the left side the nipples ranged from 4 to 9 with a mean of 6.1—, and a mode of 6; on the right side they ranged from 4 to 10 with a mean of 6.1—, and a mode of 6. The coefficient of correlation for the two sides was  $0.6063 \pm .0055$ .
6. In the whole population the arrangement of the nipples fell under the regular plan (p. 402) in 3559 cases and under the irregular plan in 2411 cases.
7. There is no obvious relation between the size of the litter and the number of nipples in the females. Though there may be as few nipples as 8 and as large litters as 15, disadvantageous combinations of large litters borne by females with few nipples cannot be of frequent occurrence. Commonly there are about twice as many nipples, 12, as young, 6.

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## APPENDIX.

Records of 1000 litters of unborn pigs showing the relative position of the pig in the uterus, its sex, and the number and arrangement of its nipples. The table begins with litters of one pig and proceeds in sequence to the largest litter, one of fifteen. The litters are numbered from 1 to 1000. The vertical heavy line indicates the line of separation between the right and left horns of the uterus; the records at the reader's left from this line represent the pigs in the left horn of the uterus, at the reader's right in the right horn. Each pig is represented by a letter and two figures: *m* indicating male, *f* indicating female, and the figures indicating the numbers of nipples on the left and on the right side of the pig. The sides of the pig correspond to the reader's right and left. When the sex letter is Roman, the arrangement of the nipples was regular (p. 402), when italic, it was irregular. Thus *m* 76 indicate a male pig with 7 nipples on the left and 6 on the right arranged irregularly, and *f* 76 indicates a female pig with the same numbers of nipples on each side as the male, but regularly arranged. The records for each litter, occupying a single line, form a series corresponding to that of the pigs in the uterus, in that the extreme left-hand record was taken from the pig nearest the left ovary, the extreme right from the one nearest the right ovary.

1	<i>m</i> 76	25	<i>m</i> 76	<i>f</i> 75	49	<i>m</i> 66	<i>f</i> 75
2	<i>f</i> 76	26	<i>m</i> 77	<i>m</i> 77	50	<i>m</i> 77	<i>m</i> 76
3	<i>m</i> 78	27	<i>f</i> 55	<i>m</i> 66	51	<i>f</i> 66	<i>f</i> 56
4	<i>m</i> 77	28	<i>m</i> 77	<i>m</i> 77	52	<i>f</i> 55	<i>f</i> 56
5	<i>m</i> 56	29	<i>f</i> 66	<i>m</i> 56	53	<i>m</i> 66	<i>m</i> 66
6	<i>m</i> 77	30	<i>m</i> 66	<i>f</i> 56	54	<i>m</i> 55	<i>m</i> 77
7	<i>f</i> 66	31	<i>m</i> 76	<i>m</i> 65	55	<i>m</i> 56	<i>m</i> 66
8	<i>m</i> 66	32	<i>m</i> 66	<i>f</i> 77	56	<i>f</i> 66	<i>f</i> 66
9	<i>m</i> 55	33	<i>f</i> 66	<i>f</i> 66	57	<i>m</i> 66	<i>m</i> 67
10	<i>m</i> 66	34	<i>f</i> 65	<i>m</i> 65	58	<i>f</i> 56	<i>m</i> 55
11	<i>f</i> 65	35	<i>m</i> 55	<i>m</i> 55	59	<i>m</i> 76	<i>f</i> 66
12	<i>f</i> 66	36	<i>m</i> 66	<i>m</i> 54	60	<i>m</i> 77	<i>m</i> 76
13	<i>f</i> 76	37	<i>f</i> 66	<i>f</i> 76	61	<i>f</i> 56	<i>m</i> 66
14	<i>m</i> 76	38	<i>m</i> 55	<i>f</i> 66	62	<i>f</i> 55	<i>m</i> 55
15	<i>f</i> 66	39	<i>f</i> 77	<i>f</i> 77	63	<i>f</i> 56	<i>f</i> 66
16	<i>f</i> 65	40	<i>f</i> 66	<i>m</i> 76	64	<i>m</i> 56	<i>f</i> 66
17	<i>m</i> 76	41	<i>m</i> 66	<i>m</i> 67	65	<i>f</i> 66	<i>f</i> 55
18	<i>m</i> 55	42	<i>m</i> 76	<i>f</i> 66	66	<i>f</i> 67	<i>m</i> 76
19	<i>m</i> 56	43	<i>m</i> 68	<i>f</i> 56	67	<i>f</i> 66	<i>f</i> 66
20	<i>f</i> 67	44	<i>f</i> 56	<i>m</i> 66	68	<i>f</i> 66	<i>f</i> 56
21	<i>m</i> 76	45	<i>m</i> 66	<i>m</i> 55	69	<i>m</i> 56	<i>m</i> 75
22	<i>f</i> 76	46	<i>f</i> 66	<i>m</i> 55	70	<i>m</i> 67	<i>f</i> 66
23	<i>f</i> 65	47	<i>f</i> 66	<i>m</i> 77	71	<i>f</i> 55	<i>f</i> 55
24	<i>m</i> 66	48	<i>m</i> 56	<i>m</i> 56	72	<i>f</i> 55	<i>f</i> 66

73	f 55	m 77	m 76
74	f 77	f 66	m 66
75	f 76	m 88	m 78
76	m 66	m 76	m 65
77	m 56	m 65	f 56
78	m 66	f 55	m 65
79	f 65	f 76	m 67
80	m 55	f 66	f 67
81	f 76	f 66	f 55
82	m 66	f 66	m 66
83	m 97	f 56	f 78
84	f 77	m 65	m 66
85	m 55	m 66	f 56
86	f 65	m 55	f 67
87	f 65	f 66	m 66
88	f 66	f 67	m 99
89	f 67	m 65	f 56
90	m 67	m 56	m 56
91	m 66	m 87	m 88
92	f 66	m 65	f 55
93	f 99	f 67	f 87
94	f 56	f 56	m 66
95	m 55	m 55	m 66
96	m 67	f 66	m 66
97	m 76	m 78	f 66
98	f 65	m 66	m 56
99	m 66	m 66	m 66
100	m 55	m 56	m 66
101	f 56	m 67	m 65
102	f 66	m 65	m 66
103	f 66	f 76	f 66
104	f 66	f 56	m 55
105	m 67	f 77	f 66
106	m 66	f 66	m 55
107	f 77	f 66	f 76
108	m 68	f 76	f 66
109	m 55	m 66	m 56
110	m 56	f 65	m 77
111	m 67	f 76	f 65
112	m 66	f 67	f 66
113	f 55	m 78	m 77
114	f 65	m 77	f 77
115	m 56	f 76	m 45
116	m 55	m 66	m 77
117	f 56	f 66	f 66
118	m 55	f 65	f 65
119	f 66	f 66	f 55
120	m 77	f 66	f 66
121	f 76	f 77	f 76
122	f 55	m 55	f 65
123	m 66	m 67	m 88
124	f 77	f 77	m 76
125	m 76	f 66	f 77
126	f 66	m 65	f 66
127	m 56	m 65	f 67
128	f 66	f 67	f 65
129	m 65	m 55	m 66
130	m 66	f 65	f 55
131	m 66	m 77	m 66
132	m 88	m 66	m 66
133	f 56	m 76	m 65
134	m 66	f 77	f 78
135	f 67	f 76	m 67
136	m 77	f 66	f 76
137	m 66	m 77	f 56
138	m 66	f 57	m 77
139	f 76	f 55	m 66
140	m 55	m 55	m 56 f 55
141	m 88	m 88	f 66 m 88
142	m 66	m 77	f 67 f 67
143	m 66	m 88	m 56 m 77
144	m 66	m 67	f 56 m 65
145	m 66	m 65	f 65 f 77
146	m 87	m 55	f 66 m 88
147	f 56	f 68	f 55 m 76
148	m 55	f 56	f 66 f 55
149	f 76	f 77	f 66 m 66
150	f 65	f 66	m 65 f 55
151	m 76	f 66	f 66 f 55
152	m 77	m 77	m 87 m 77
153	m 66	m 66	f 77 m 66
154	f 66	f 67	f 56 f 66
155	f 65	m 55	f 55 f 65
156	m 66	m 76	f 67 f 66
157	f 66	m 55	m 56 f 55
158	m 66	f 66	f 66 m 67
159	f 56	f 55	f 55 m 55
160	m 78	f 67	f 67 m 87
161	f 55	f 57	f 66 m 67
162	f 65	m 66	f 56 f 76
163	f 56	m 66	m 77 f 76
164	m 66	f 56	m 55 m 66
165	m 76	m 66	m 65 f 66
166	m 66	f 65	f 66 m 87
167	f 66	f 66	m 66 m 66
168	m 55	m 66	f 55 f 55
169	m 67	m 56	f 66 m 67
170	f 66	m 65	m 78 f 66
171	f 66	m 66	m 66 f 66
172	f 76	m 66	m 76 m 66
173	f 67	f 66	m 66 f 67
174	f 66	m 75	m 56 f 56
175	m 66	f 56	f 56 m 66
176	m 77	m 56	f 56 m 67
177	f 57	m 66	f 55 f 67
178	m 66	f 77	f 66 m 55
179	f 55	m 77	f 65 f 66
180	m 55	m 66	f 66 m 55
181	f 67	m 56	m 77 m 66



182	f 77	f 89	f 88	f 89	237	f 77	m 78	m 76	m 88
183	f 66	m 56	m 66	f 66	238	f 65	f 56	m 66	m 56
184	m 99	m 98	f 66	m 77	239	m 66	f 66	f 66	f 67
185	m 88	f 77	f 66	m 56	240	m 66	f 66	f 66	f 56
186	f 76	m 66	f 75	m 56	241	m 66	f 55	f 65	m 66
187	m 78	m 77	f 66	m 77	242	m 76	f 66	f 76	m 65
188	m 66	m 66	f 66	f 66	243	f 66	m 77	m 65	f 66
189	m 65	m 77	m 77	f 77	244	m 76	m 65	m 56	m 65
190	f 66	m 66	f 66	m 66	245	f 55	m 55	m 56	m 55
191	f 76	m 76	f 67	m 76	246	f 77	m 88	m 88	f 77
192	m 76	f 67	m 56	f 66	247	f 55	f 56	m 55	f 55
193	f 65	f 56	f 55	f 56	248	f 56	f 55	f 55	f 55
194	m 66	m 55	f 66	f 55	249	m 77	m 66	f 55	m 67
195	f 67	f 67	f 66	m 76	250	f 76	f 67	m 57	m 56
196	f 56	f 66	m 76	f 66	251	m 66	f 65	m 65	f 66
197	m 66	m 77	f 77	m 76	252	f 77	f 87	m 87	f 77
198	m 66	m 66	m 66	m 77	253	f 55	m 55	f 55	f 55
199	f 66	f 66	f 55	f 56	254	m 89	f 66	m 76	m 67
200	f 67	m 76	m 66	f 55	255	f 65	f 76	f 66	f 67
201	m 66	m 67	f 67	m 67	256	f 75	m 55	m 66	f 56
202	m 76	f 77	f 77	m 87	257	m 68	m 66	m 88	f 67
203	f 57	m 66	f 56	m 66	258	m 66	m 65	f 65	f 66
204	m 67	f 66	m 66	m 76	259	f 66	m 66	m 66	f 66
205	f 56	f 56	m 56	m 77	260	m 77	f 55	f 76	m 66
206	m 66	f 67	m 56	m 66	261	m 65	m 66	m 66	m 56
207	f 56	f 56	f 55	m 56	262	m 56	m 77	m 55	f 55
208	f 55	m 56	m 65	f 65	263	f 76	m 67	f 76	f 77
209	m 66	m 66	f 56	f 55	264	f 66	m 76	f 65	f 56
210	f 76	m 66	m 77	m 77	265	m 67	m 66	m 56	m 76
211	f 55	m 66	f 66	f 66	266	f 65	m 67	m 67	m 77
212	f 56	m 66	m 55	m 55	267	m 67	m 66	m 56	m 66
213	m 65	f 67	f 66	f 67	268	m 76	f 67	m 89	f 66
214	f 55	m 66	f 66	m 55	269	f 78	m 56	m 66	f 66
215	m 66	m 65	m 87	m 66	270	m 66	f 76	m 77	f 66
216	m 56	f 66	m 88	m 66	271	m 66	m 67	m 76	m 56
217	m 55	f 77	f 55	f 55	272	f 55	f 55	f 55	f 55
218	f 65	m 55	f 55	f 56	273	m 66	f 66	f 66	m 77
219	f 56	f 66	m 65	m 77	274	m 66	m 77	m 66	f 56 m 66
220	m 65	f 65	f 65	m 55	275	f 66	m 66	m 56	m 66 m 65
221	m 78	f 67	f 66	f 65	276	f 76	m 66	f 66	m 66 m 66
222	m 67	m 56	m 66	f 66	277	m 76	m 78	f 66	f 65 m 66
223	f 76	m 67	f 56	f 66	278	f 66	f 66	f 66	f 65 f 56
224	m 66	f 56	f 65	m 55	279	m 57	f 56	f 66	f 65 f 77
225	m 66	f 66	f 56	f 66	280	m 76	m 87	f 76	m 66 f 66
226	f 55	f 66	f 76	m 67	281	f 77	f 66	f 66	m 77 f 56
227	f 55	f 65	m 67	m 56	282	f 66	m 56	m 76	f 55 m 67
228	f 57	m 65	f 55	m 56	283	f 65	f 66	f 77	m 77 m 76
229	f 66	m 66	f 66	m 66	284	m 66	f 65	m 66	m 76 m 76
230	m 77	m 67	m 67	f 66	285	m 56	m 56	f 66	f 66 m 66
231	m 66	f 56	f 66	f 55	286	f 66	f 65	m 75	f 66 f 55
232	m 55	f 65	m 77	m 66	287	m 65	f 56	m 66	f 65 m 57
233	m 77	f 77	f 77	f 65	288	f 66	m 66	m 76	f 67 m 66
234	f 66	f 66	m 67	m 76	289	m 77	f 65	f 55	m 77 f 56
235	m 66	f 55	f 66	f 57	290	f 55	m 77	f 55	m 66 f 55
236	m 55	m 55	f 57	m 66	291	m 56	m 56	f 65	m 66 m 56



292	f 55	f 65	f 55	f 55	f 66	347	f 66	f 56	m 56	m 56	m 55
293	m 87	f 66	m 67	f 55	f 66	348	f 55	f 56	m 65	f 56	f 66
294	f 75	f 55	f 55	m 55	f 55	349	f 56	f 66	f 77	f 56	f 66
295	f 56	m 77	f 66	m 77	m 67	350	f 66	m 66	m 55	f 66	f 55
296	m 66	f 76	m 65	f 67	f 66	351	f 66	m 77	f 66	f 79	m 77
297	m 66	f 66	m 66	f 66	f 66	352	m 88	m 65	f 76	m 77	m 87
298	m 66	f 55	m 55	m 56	m 56	353	f 56	m 66	m 56	f 77	f 66
299	m 56	m 55	m 67	f 55	f 65	354	f 67	m 66	f 77	f 55	f 65
300	f 66	m 67	m 67	f 66	m 65	355	m 55	f 55	m 67	f 55	m 56
301	f 65	m 66	m 66	f 56	m 66	356	f 65	f 65	m 76	f 66	m 66
302	f 56	f 66	m 65	m 66	m 56	357	f 55	f 55	f 55	f 66	m 65
303	m 66	f 66	m 67	f 67	f 66	358	f 77	f 66	f 78	f 66	m 87
304	f 67	f 66	f 66	m 67	f 66	359	m 67	m 77	m 66	m 87	f 66
305	m 66	f 66	f 66	m 86	f 65	360	f 66	f 66	f 66	f 67	m 67
306	m 67	f 67	f 56	m 66	m 66	361	f 66	m 55	m 55	f 66	f 55
307	m 77	f 66	m 77	f 56	m 56	362	m 55	m 55	m 55	m 55	f 55
308	m 77	m 75	f 66	f 66	m 77	363	m 77	m 77	m 66	f 67	f 76
309	f 66	m 66	f 67	f 66	m 66	364	m 66	f 56	m 55	f 55	m 56
310	m 77	f 65	m 57	m 76	m 77	365	f 67	f 66	m 75	f 67	m 66
311	f 65	f 75	m 55	f 66	m 66	366	f 65	f 66	f 67	m 66	f 67
312	f 66	f 66	f 55	m 55	m 66	367	f 67	m 66	f 77	m 77	f 67
313	f 55	f 66	m 66	f 55	m 65	368	f 76	f 66	f 66	m 76	f 66
314	m 67	f 67	f 56	f 66	m 66	369	f 76	f 66	m 67	f 66	m 77
315	f 66	f 76	f 66	f 56	f 66	370	f 56	m 65	f 66	f 66	f 56
316	m 67	f 66	m 77	f 66	m 76	371	f 65	m 66	m 66	f 56	f 55
317	f 76	m 55	m 66	f 56	m 66	372	m 56	f 66	m 66	m 66	f 65
318	f 65	f 55	f 65	f 56	f 55	373	f 55	f 55	f 77	f 66	m 77
319	m 66	f 66	m 55	m 66	m 75	374	m 65	m 55	f 76	f 65	f 66
320	f 56	m 77	m 65	m 67	m 65	375	m 76	f 56	m 77	f 56	m 77
321	f 67	m 77	m 66	f 77	f 65	376	m 76	f 77	m 77	f 66	m 76
322	m 56	m 65	f 66	m 55	m 76	377	m 66	f 65	m 77	m 66	f 66
323	f 56	f 67	m 67	m 66	m 75	378	m 66	m 66	m 66	f 65	m 67
324	m 77	m 87	f 77	f 66	m 67	379	f 66	f 55	m 65	m 66	m 67
325	f 78	m 66	f 67	m 77	m 67	380	m 66	f 66	m 67	m 66	f 77
326	f 56	m 65	f 56	f 56	m 77	381	f 66	f 55	f 67	f 56	m 55
327	m 77	m 66	m 77	m 77	f 77	382	m 76	m 55	f 76	f 66	f 66
328	m 55	f 65	f 55	m 56	f 76	383	f 56	f 55	m 66	f 55	f 55
329	m 67	f 56	m 76	m 78	f 77	384	m 77	f 76	f 66	m 78	m 67
330	m 55	m 76	f 66	f 56	f 66	385	m 66	f 76	f 57	f 56	f 65
331	m 66	f 67	m 56	m 66	m 66	386	m 56	f 66	m 66	f 77	f 66
332	m 66	m 66	m 75	m 66	f 55	387	f 66	m 56	m 65	f 66	m 55
333	f 67	m 66	m 65	m 67	f 66	388	f 55	f 66	m 66	m 56	m 66
334	f 66	f 55	f 75	m 66	f 55	389	f 77	m 77	f 66	f 66	f 66
335	m 87	f 67	f 55	m 76	f 56	390	f 56	m 77	f 76	m 77	m 66
336	f 67	m 87	m 77	f 76	m 77	391	f 65	m 87	m 78	f 78	f 77
337	m 66	m 67	f 65	f 65	m 67	392	f 66	f 65	f 66	m 56	f 56
338	m 77	f 66	f 56	m 66	f 75	393	f 66	f 66	f 66	m 66	f 66
339	f 66	m 56	f 77	f 66	m 66	394	m 56	f 55	f 55	f 56	m 65
340	m 66	m 88	m 67	m 77	f 56	395	f 56	f 66	m 87	m 55	m 55
341	f 66	m 66	m 56	m 55	f 55	396	f 66	m 65	f 65	f 66	m 66
342	f 77	f 66	m 67	m 67	f 66	397	m 67	f 66	m 66	f 66	m 66
343	m 56	f 66	m 76	m 66	m 77	398	m 67	m 77	f 67	m 65	m 67
344	f 76	f 67	f 87	m 77	m 66	399	f 55	f 66	f 55	m 55	m 55
345	m 55	f 55	m 56	m 55	m 65	400	m 76	f 56	f 55	f 67	m 55
346	m 56	m 65	m 67	f 66	m 76	401	f 66	m 76	m 66	m 66	f 66

402	m 75	f 77	m 77	f 66	m 87	457	f 67	m 55	m 77	f 66	f 45	f 57
403	f 56	m 66	f 56	f 65	f 67	458	m 66	f 66	m 66	f 66	f 66	m 66
404	m 76	m 65	f 66	f 66	m 66	459	f 66	m 77	m 77	m 75	m 66	f 56
405	f 56	f 55	f 77	f 66	m 76	460	m 66	m 66	m 67	f 56	f 66	f 66
406	f 76	f 66	f 67	f 66	m 66	461	m 65	m 65	f 77	m 65	f 76	m 66
407	m 76	f 67	f 66	m 66	m 66	462	m 66	m 77	f 66	f 76	f 76	m 77
408	m 65	f 77	f 77	m 65	m 76	463	m 56	m 76	f 55	m 67	m 65	f 66
409	m 66	m 66	m 66	f 65	m 56	464	f 66	m 77	f 55	m 77	m 65	m 56
410	f 86	m 76	f 67	m 87	m 77	465	f 76	m 66	f 75	m 66	m 86	m 67
411	f 66	m 66	f 66	f 66	m 55	m 66	466	m 66	m 55	f 56	m 55	m 55
412	m 67	m 55	m 66	f 56	m 66	f 76	467	f 66	m 66	f 55	m 66	m 66
413	f 56	f 66	m 65	f 55	f 55	m 65	468	f 98	m 76	f 65	m 88	f 77
414	m 56	f 56	f 66	f 77	f 66	m 55	469	m 66	m 66	f 66	m 66	m 66
415	m 66	m 55	m 56	f 55	f 55	f 55	470	f 66	f 77	f 66	f 55	f 66
416	f 55	f 56	f 56	f 55	f 55	m 55	471	f 67	m 67	f 76	m 78	f 76
417	f 66	f 66	f 67	f 56	m 66	f 56	472	m 66	m 66	m 77	f 66	m 88
418	m 65	m 66	f 66	m 66	m 77	f 66	473	m 88	m 66	f 67	m 57	m 66
419	m 56	f 66	m 55	f 65	m 55	f 86	474	m 66	m 56	m 66	m 66	f 55
420	m 56	f 55	m 66	f 76	m 66	m 66	475	f 56	f 56	f 55	m 67	m 57
421	m 77	m 66	f 66	f 56	m 76	m 56	476	f 65	f 56	f 65	f 66	f 55
422	f 66	m 55	m 56	m 55	m 66	f 65	477	f 65	m 67	m 87	f 66	m 66
423	f 66	f 65	m 56	f 66	m 66	f 76	478	f 65	m 65	m 56	f 66	m 55
424	f 67	f 56	f 66	f 66	f 56	f 67	479	m 66	m 76	m 66	m 65	f 66
425	f 56	f 67	m 65	f 55	m 56	m 77	480	m 65	m 66	m 66	m 66	m 67
426	f 77	m 67	f 66	f 76	f 76	f 77	481	m 78	m 76	m 76	f 65	f 66
427	f 66	f 66	m 66	m 56	f 66	m 67	482	m 66	m 55	m 65	f 66	f 55
428	f 66	f 67	f 76	f 66	m 66	m 66	483	m 66	m 76	f 66	m 55	f 55
429	f 55	m 55	f 65	m 56	m 66	f 66	484	f 56	f 66	m 66	m 78	f 66
430	m 66	m 76	f 77	f 66	m 77	m 77	485	m 66	f 66	f 66	m 66	f 66
431	f 66	m 66	f 56	f 66	m 56	f 66	486	m 66	f 66	f 66	m 66	m 67
432	m 76	f 56	m 67	f 77	f 76	f 55	487	f 66	f 66	f 66	m 87	m 66
433	m 56	f 57	m 66	f 56	m 76	f 56	488	m 76	f 65	m 65	f 66	m 88
434	f 56	m 56	f 55	f 66	m 77	m 76	489	m 66	f 56	m 56	f 56	f 55
435	m 66	m 65	f 65	f 66	m 55	m 77	490	f 76	f 66	m 77	m 77	f 66
436	f 55	m 66	m 66	f 66	f 56	f 66	491	f 56	m 66	f 56	f 55	m 55
437	f 56	m 66	m 67	m 77	m 67	f 66	492	m 66	m 56	f 66	m 66	m 67
438	f 66	m 66	m 65	m 66	m 76	m 77	493	f 77	f 55	m 66	f 65	f 56
439	m 78	m 66	m 65	m 77	m 66	m 77	494	f 66	f 66	m 76	f 66	m 66
440	m 75	m 65	f 55	m 67	f 45	f 55	495	f 55	m 66	m 67	f 88	m 67
441	m 66	m 77	f 77	m 76	f 77	m 77	496	m 66	f 65	m 77	m 66	m 76
442	f 66	m 65	m 65	m 57	f 67	f 67	497	m 56	m 66	f 66	f 56	m 66
443	m 77	m 67	f 66	m 78	f 77	m 77	498	f 55	f 56	m 55	m 55	m 56
444	f 56	m 77	m 67	f 56	f 66	f 55	499	m 67	m 77	f 66	f 66	m 66
445	m 88	f 66	f 76	m 88	m 66	f 76	500	f 56	f 66	f 66	m 77	f 66
446	f 67	m 77	f 55	m 66	f 66	m 56	501	m 77	m 66	f 66	m 56	m 66
447	f 76	m 66	m 66	m 77	f 66	m 77	502	m 77	f 66	m 67	m 66	f 66
448	f 55	m 66	m 66	f 67	m 66	f 66	503	f 55	f 56	m 66	f 66	m 77
449	f 55	m 58	m 56	f 66	f 55	m 76	504	m 78	f 67	f 66	f 66	m 88
450	m 67	f 56	m 77	f 77	m 67	m 77	505	m 55	m 55	f 57	m 66	m 66
451	f 65	f 65	f 66	f 55	m 56	m 66	506	m 56	m 55	m 66	m 55	m 66
452	f 66	f 65	f 56	f 67	f 66	m 66	507	m 55	m 67	m 55	m 66	f 65
453	m 55	f 66	m 66	m 67	f 66	f 66	508	m 66	m 65	f 55	f 66	f 55
454	f 55	m 67	m 66	f 66	f 66	m 65	509	f 77	m 88	f 56	f 66	m 65
455	m 66	m 77	m 65	f 66	m 66	f 66	510	m 66	m 66	m 67	f 55	f 66
456	m 56	m 56	m 56	m 56	f 66	m 76	511	f 76	m 67	f 66	f 77	m 76

512	f 76	f 66	m 66	m 78	m 76	m 77	567	m 77	f 77	m 78	m 77	f 67	f 77
513	f 65	m 65	m 66	f 67	m 76	m 66	568	f 77	m 66	f 66	f 67	m 77	f 66
514	f 67	m 77	m 66	f 66	m 76	f 66	569	f 66	f 56	m 57	m 56	m 66	m 55
515	m 66	f 77	m 76	f 67	f 67	m 87	570	m 65	m 65	m 66	f 55	f 55	f 55
516	f 66	f 66	f 66	m 87	m 87	f 66	571	f 66	m 65	m 66	m 88	f 65	f 67
517	m 77	m 88	m 56	f 66	m 67	f 88	572	m 76	m 66	f 66	f 55	f 66	f 77
518	f 66	m 56	f 76	f 76	f 67	f 65	573	m 56	m 66	f 66	f 56	m 56	f 55
519	m 66	f 66	m 76	f 66	f 66	f 66	574	f 66	f 66	f 77	f 66	m 66	m 55
520	f 77	f 66	f 65	m 66	m 77	f 66	575	f 78	f 77	f 66	m 55	f 76	f 67
521	m 77	f 78	f 66	f 67	m 67	f 56	576	m 67	f 66	f 65	f 66	f 66	f 65
522	m 66	m 67	f 66	f 78	f 67	f 76	577	m 56	f 67	m 77	f 56	f 66	f 66
523	f 55	f 66	m 55	m 66	m 66	f 55	578	m 67	f 55	m 78	m 67	f 55	m 57
524	m 77	m 66	m 66	m 67	m 55	f 56	579	f 56	f 55	f 66	f 66	m 66	m 66
525	m 66	m 66	f 56	m 55	m 55	f 65	580	m 55	f 56	f 66	m 55	f 75	f 67
526	m 66	m 66	m 66	f 65	f 77	m 77	581	m 65	m 76	f 66	m 88	f 55	f 65
527	f 77	m 77	m 77	f 66	f 66	f 77	582	m 77	m 77	f 66	m 67	m 57	m 66
528	m 77	f 56	f 77	f 77	m 76	m 66	583	m 56	m 77	f 55	f 66	m 56	m 76
529	f 55	m 56	f 55	f 55	m 66	m 66	584	f 66	m 77	f 66	f 55	f 55	m 66
530	m 76	m 77	f 87	f 66	f 87	f 77	585	f 78	f 77	f 77	m 66	f 77	m 76
531	f 65	f 66	f 56	f 56	m 65	f 76	586	m 68	m 56	m 67	f 67	m 56	m 65
532	m 66	m 56	f 65	m 87	f 66	f 66	587	f 66	f 55	m 77	m 78	m 76	m 65
533	m 57	f 66	f 56	f 56	m 66	m 66	588	m 76	m 66	m 77	m 55	f 75	f 67
534	m 67	m 66	f 76	f 66	f 67	f 66	589	f 56	m 56	m 76	f 55	f 76	f 77
535	m 66	f 56	f 56	f 66	f 66	f 66	590	m 55	f 75	m 67	f 77	m 66	f 76
536	m 67	f 66	f 66	f 67	m 77	m 77	591	f 66	m 66	f 66	m 56	m 56	m 55
537	f 66	m 66	m 55	m 66	m 65	f 66	592	f 56	f 66	m 67	m 55	m 76	m 66
538	f 66	m 66	m 66	m 66	f 66	f 65	593	f 66	m 55	f 65	m 56	f 76	f 66
539	m 77	m 56	m 56	f 67	f 66	m 57	594	m 66	f 55	m 66	m 66	m 77	f 56
540	f 66	f 55	m 55	m 56	f 55	m 66	595	m 77	f 66	m 76	m 87	m 77	m 66
541	f 66	m 56	m 66	f 66	m 66	f 66	596	m 56	m 67	f 56	m 66	m 56	m 76
542	m 65	f 55	f 56	m 66	m 66	m 67	597	f 65	f 66	f 67	m 66	f 55	f 66
543	m 78	m 77	f 66	f 77	f 67	f 66	598	f 77	f 77	f 66	f 66	f 76	m 66
544	f 67	f 76	m 66	f 66	m 65	m 55	599	m 67	m 78	m 77	f 67	f 78	f 56
545	m 66	m 66	f 66	f 56	m 65	m 56	600	f 78	m 77	f 66	f 55	m 65	m 56
546	m 76	m 88	m 66	f 78	m 76	m 77	601	f 65	m 66	m 66	m 77	m 55	f 66
547	f 65	f 55	f 56	m 76	m 65	m 76	602	m 66	m 65	f 56	f 66	m 55	f 56
548	m 56	f 57	f 67	f 67	m 66	f 76	603	f 66	m 57	m 77	m 77	f 67	f 65
549	f 76	m 66	f 87	m 87	f 86	m 76	604	f 56	f 65	m 66	f 55	m 76	m 66
550	m 77	m 65	m 66	m 56	m 77	f 65	605	m 57	f 56	f 55	m 66	m 56	m 67
551	f 66	m 66	m 77	m 76	m 67	f 66	606	m 76	m 87	m 77	f 66	f 88	m 66
552	m 86	f 67	m 65	f 67	f 76	f 76	607	m 66	f 56	f 55	m 65	f 56	f 55
553	f 76	m 67	m 76	f 66	m 88	f 66	608	m 56	f 76	m 66	m 77	m 77	f 66
554	f 66	f 66	m 66	f 65	f 65	f 66	609	f 55	f 66	f 77	m 66	f 66	f 65
555	f 55	f 77	f 77	f 66	f 66	f 66	610	f 55	m 67	m 55	m 66	m 65	f 55
556	f 55	m 77	f 55	m 65	m 67	f 66	611	f 66	m 66	f 66	m 66	f 66	f 66
557	m 88	f 67	f 56	m 66	f 77	m 77	612	m 66	f 66	m 77	m 66	m 56	m 56
558	m 55	f 66	f 55	f 55	m 67	f 56	613	f 66	m 66	f 55	f 55	m 67	m 66
559	f 65	m 66	m 87	f 56	m 66	m 56	614	m 66	m 76	m 56	m 65	m 56	m 65
560	m 77	m 88	m 56	f 77	f 56	f 66	615	f 76	m 66	f 76	m 77	m 76	m 66
561	m 65	m 56	m 57	f 55	m 87	f 56	616	f 55	m 76	m 66	f 56	f 66	m 66
562	f 66	m 67	m 76	m 66	f 76	m 66	617	m 77	f 66	f 66	m 67	f 67	m 66
563	f 55	f 67	f 55	f 66	m 66	f 56	618	m 77	f 67	f 87	f 77	m 77	m 77
564	m 77	f 56	m 57	m 66	f 76	f 76	619	m 66	f 65	f 56	f 56	m 66	m 87
565	f 77	m 78	m 66	f 66	m 76	m 77	620	f 67	m 66	m 76	f 65	f 77	f 66
566	m 78	f 66	f 77	f 67	f 77	m 77	621	f 87	m 67	f 77	m 66	m 76	m 76

622	m 66	f 56	m 66	f 65	m 77	f 66	m 56
623	m 78	m 56	f 66	f 56	f 66	m 67	m 76
624	m 56	f 65	m 55	f 65	m 56	f 66	m 55
625	f 55	m 66	f 55	f 56	f 56	f 65	f 66
626	m 66	f 65	m 88	f 66	f 67	m 67	f 77
627	f 66	f 66	f 66	m 66	f 77	m 67	m 55
628	m 55	m 56	m 66	m 67	f 66	m 66	m 76
629	m 55	m 66	m 77	f 66	f 66	m 66	f 66
630	m 78	f 76	m 56	m 56	m 66	m 56	f 56
631	m 76	m 56	m 77	m 56	m 66	m 66	f 66
632	f 55	f 55	m 55	f 65	f 55	f 55	m 55
633	f 56	f 66	f 66	f 76	f 67	f 66	m 66
634	m 67	m 55	m 66	f 65	m 65	f 55	m 55
635	f 55	m 66	m 55	m 76	f 65	m 77	m 77
636	m 55	f 56	m 66	f 55	m 56	f 55	m 56
637	m 77	m 66	f 77	f 66	f 57	f 76	f 76
638	m 66	m 77	f 55	f 77	f 66	m 67	m 77
639	f 56	f 66	f 55	f 56	m 65	m 66	f 66
640	f 55	f 66	m 77	m 67	f 66	f 67	m 77
641	m 66	f 77	f 55	m 56	m 56	f 55	f 45
642	f 66	m 65	f 66	m 76	f 65	f 66	m 56
643	f 76	f 66	f 66	m 88	f 67	f 66	f 76
644	m 76	m 77	f 66	f 66	m 76	f 66	m 77
645	f 55	f 55	m 65	f 55	f 56	f 55	m 55
646	m 66	f 66	m 66	f 65	f 66	f 66	m 66
647	m 66	m 77	m 66	f 78	f 66	m 76	m 78
648	m 55	m 56	m 77	m 56	f 66	m 77	f 56
649	m 56	f 67	f 55	m 66	f 65	f 55	f 65
650	m 56	f 66	m 77	m 56	m 67	m 67	f 77
651	m 67	m 77	f 77	m 67	m 78	m 77	m 77
652	f 66	m 66	f 56	m 66	f 66	m 66	m 66
653	f 65	f 66	f 66	f 55	m 77	f 66	f 66
654	m 67	m 77	f 76	m 66	m 66	f 66	m 65
655	m 67	f 56	f 55	f 55	f 77	f 66	f 66
656	f 66	m 77	f 66	m 56	m 66	f 66	m 66
657	m 66	m 56	f 66	f 77	m 65	m 66	m 66
658	m 65	m 66	m 65	m 56	f 66	m 56	m 55
659	f 65	f 66	f 56	f 55	f 65	f 66	f 66
660	m 67	m 66	m 66	m 77	f 77	f 77	m 77
661	m 66	m 76	f 66	f 55	m 76	f 56	m 66
662	f 66	f 76	f 66	m 77	m 66	m 67	m 76
663	f 66	f 66	f 67	f 66	f 66	m 77	m 87
664	m 66	m 87	f 56	f 56	f 66	f 56	m 66
665	m 56	m 77	m 67	m 66	m 66	m 77	f 66
666	m 56	m 67	m 87	m 76	m 66	m 77	m 66
667	m 77	f 65	m 88	m 77	m 87	f 66	f 76
668	f 55	f 56	f 67	m 66	m 76	m 56	m 66
669	f 56	f 55	f 55	m 55	m 66	f 66	m 55
670	f 66	f 78	f 56	f 66	m 66	m 56	f 67
671	f 66	f 77	m 77	m 76	m 76	f 77	m 66
672	f 77	f 76	m 77	f 78	m 67	f 87	m 76
673	f 67	f 67	m 88	f 66	f 66	m 66	m 66
674	m 77	f 55	m 66	f 65	f 67	m 66	m 66
675	m 66	m 76	f 77	m 66	m 87	m 66	m 67
676	f 55	m 66	m 56	f 56	f 66	f 65	f 66

677	m	56	f	65	f	55	f	65	f	67	f	65	m	56
678	m	76	m	55	m	66	m	55	f	76	f	56	m	66
679	f	67	f	77	f	66	m	65	f	67	m	86	m	66
680	m	55	m	66	f	76	m	66	f	67	m	56	f	76
681	f	66	m	66	m	66	m	55	m	87	f	66	m	66
682	m	87	f	65	m	88	f	75	m	76	m	66	m	55
683	m	55	f	66	m	87	m	77	f	77	m	87	f	66
684	m	76	m	76	f	66	f	66	f	66	f	55	m	55
685	m	76	f	66	m	76	f	87	m	66	f	77	f	66
686	f	55	m	66	m	67	m	77	m	66	m	66	f	55
687	m	66	m	66	f	67	m	66	m	56	m	66	f	65
688	m	66	m	66	m	67	m	66	m	66	m	66	m	66
689	m	67	m	86	m	78	m	66	f	66	f	76	f	66
690	m	77	m	88	m	77	f	76	m	67	m	78	f	77
691	m	87	f	66	f	56	m	66	m	66	m	67	m	67
692	f	77	f	66	m	67	f	77	f	56	f	77	f	66
693	m	65	m	67	f	76	m	66	f	88	f	55	m	77
694	m	55	m	67	f	65	m	66	m	76	m	66	m	56
695	m	66	m	66	m	66	f	67	m	66	f	66	m	66
696	m	66	f	66	m	66	f	77	f	66	m	56	f	57
697	f	76	f	55	f	55	f	66	f	76	f	56	m	56
698	f	66	f	76	f	66	m	88	f	66	m	77	f	76
699	m	67	f	55	m	56	m	55	m	66	m	66	f	66
700	m	66	f	66	m	76	m	77	f	67	m	77	m	66
701	f	66	m	66	f	66	m	66	m	77	f	66	m	65
702	f	66	f	67	m	77	m	77	m	66	m	77	m	65
703	m	56	f	76	m	67	m	88	m	66	m	66	f	76
704	m	55	f	65	f	66	m	66	m	56	m	55	m	66
705	m	66	m	66	m	68	f	66	m	66	f	66	f	55
706	f	77	f	66	m	66	f	67	f	67	m	56	f	75
707	f	66	m	65	m	76	f	66	m	66	f	66	m	66
708	m	77	f	78	f	77	f	68	m	66	f	67	m	67
709	f	66	m	77	f	77	m	67	f	56	m	76	m	76
710	f	55	m	77	f	66	f	67	m	56	m	66	m	55
711	m	66	m	65	m	66	m	56	f	65	m	66	f	66
712	m	76	f	55	m	67	f	56	m	67	m	55	f	56
713	m	66	m	67	f	56	f	65	f	66	m	65	m	56
714	f	76	f	55	m	56	m	66	f	66	m	66	f	55
715	m	89	f	78	f	88	m	88	m	810	m	87	m	89
716	m	66	f	65	m	55	m	65	m	66	m	66	f	56
717	f	87	m	76	m	76	f	66	f	66	f	65	m	58
718	m	66	f	66	m	66	m	66	m	56	f	77	f	66
719	f	56	f	67	m	77	f	77	m	77	f	65	m	78
720	f	77	m	67	m	67	m	66	m	78	f	88	m	77
721	m	66	m	66	m	56	f	66	f	66	m	66	m	66
722	m	67	f	76	f	76	f	66	m	67	m	79	f	76
723	m	66	m	77	f	65	f	67	f	65	f	56	m	66
724	m	88	f	77	f	56	f	66	m	77	f	77	m	77
725	f	55	f	66	f	56	f	65	f	56	m	77	m	66
726	m	76	m	77	f	87	m	66	m	65	f	77	f	66
727	m	77	f	76	m	76	m	66	f	77	f	76	f	76
728	m	55	m	66	m	66	m	56	m	66	f	66	f	56
729	f	66	m	66	f	55	m	56	f	77	m	66	m	66
730	m	66	m	56	m	66	f	66	f	55	m	65	m	76
731	m	66	f	55	m	55	m	65	m	55	f	65	m	55

732	f 65	m 66	f 76	f 55	f 66	m 77	m 77
733	m 66	m 55	f 56	m 66	m 67	m 77	m 66
734	m 77	f 67	f 57	m 77	f 76	m 66	f 66
735	f 67	f 77	f 66	m 76	m 66	m 87	m 56
736	f 66	f 66	m 57	f 56	f 66	f 56	m 76
737	f 66	m 78	f 65	f 55	f 66	m 65	m 66
738	f 66	f 66	f 66	m 77	m 67	f 76	f 56
739	f 66	f 55	m 66	f 77	m 86	m 66	m 77
740	m 65	m 66	f 66	f 66	m 77	m 76	f 66
741	f 67	f 66	f 57	m 77	m 76	m 67	m 87
742	f 66	m 66	f 65	f 66	m 55	m 56	f 56
743	f 56	m 77	f 67	f 56	m 78	f 86	m 77
744	m 77	f 65	f 76	f 66	m 66	m 76	f 66
745	f 66	m 66	f 55	m 66	m 66	m 76	m 56
746	f 66	m 67	m 88	m 67	f 56	m 77	f 77
747	f 77	m 67	f 76	m 66	f 78	m 67	f 66
748	m 66	f 66	f 56	f 56	f 66	f 56	m 65
749	f 66	m 66	f 55	f 76	f 66	m 77	m 68
750	m 66	f 65	m 67	m 66	m 56	f 56	f 66
751	f 66	f 66	m 66	m 77	m 78	m 77	f 66
752	m 66	f 55	f 65	m 66	f 66	f 56	m 66
753	m 77	m 66	m 67	m 77	f 56	m 67	f 66
754	f 56	m 56	f 67	m 66	f 66	m 76	f 66
755	f 77	f 66	m 77	m 77	f 76	f 76	m 65
756	f 55	f 56	f 56	f 56	m 77	m 86	f 65
757	m 66	m 77	m 66	f 77	f 76	m 66	m 77
758	f 66	f 66	f 76	m 77	f 66	m 55	f 66
759	m 55	f 55	m 55	f 55	m 65	f 55	f 55
760	m 55	f 65	f 56	m 65	f 55	m 56	m 55
761	m 66	f 55	f 66	f 56	m 66	m 66	f 76
762	m 66	m 88	m 67	f 78	f 66	f 56	m 66
763	f 77	m 77	f 66	f 66	f 56	f 55	f 66
764	f 76	m 67	m 66	f 66	f 66	m 66	m 77 f 56
765	f 78	f 66	m 88	m 77	m 77	f 66	m 78 m 87
766	m 56	m 66	m 67	m 66	m 56	m 66	m 55 m 56
767	m 66	m 67	f 76	m 77	m 77	f 67	f 65 m 66
768	f 66	f 57	m 56	m 66	f 67	f 66	m 75 f 56
769	m 66	f 56	f 66	f 75	m 65	m 66	f 66 f 65
770	m 66	m 66	f 78	f 66	f 66	m 77	f 77 m 77
771	m 66	f 76	f 66	f 66	m 56	f 76	m 56 m 66
772	m 65	m 68	f 67	f 66	m 66	m 67	f 55 m 67
773	f 66	f 67	m 76	f 66	f 77	f 66	f 76 m 67
774	f 66	m 56	f 76	f 66	m 76	m 76	m 66 m 66
775	m 77	f 66	f 66	m 67	m 67	m 76	f 55 f 55
776	f 55	m 87	f 76	m 66	f 55	f 56	m 77 m 66
777	f 66	m 66	f 66	f 66	m 67	f 55	f 76 m 66
778	m 66	m 66	m 65	m 66	m 65	m 56	m 66 m 66
779	f 55	m 56	f 77	m 65	f 55	m 55	m 66 f 76
780	m 55	f 56	m 66	m 66	f 55	m 66	f 56 f 56
781	m 87	f 66	f 56	m 78	m 56	f 56	f 77 f 67
782	f 66	m 66	f 55	f 65	m 66	m 66	f 66 f 67
783	m 56	f 66	f 66	f 55	f 55	f 65	m 55 m 67
784	m 67	m 66	m 55	f 66	m 76	m 66	f 66 f 77
785	m 66	f 87	f 57	f 98	f 67	f 78	m 65 f 77
786	f 56	m 56	m 66	f 66	m 66	f 55	m 66 f 56



787	m 66	m 56	f 66	m 66	m 56	f 66	f 56	f 67
788	m 56	f 77	m 56	m 66	m 65	m 77	m 66	m 56
789	f 55	m 56	f 66	m 67	m 77	m 56	m 76	f 66
790	m 55	f 56	f 66	m 65	m 56	f 77	f 56	f 65
791	m 77	m 76	m 77	m 66	f 66	f 76	m 77	f 76
792	f 77	m 66	f 76	m 66	m 77	f 66	f 66	f 66
793	f 65	m 66	m 66	f 56	m 55	m 66	m 66	m 56
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